



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,347	08/26/2003	Jian J. Chen	2328-050A	3505

7590 03/09/2005

LOWE HAUPTMAN GILMAN & BERNER, LLP
Suite 300
1700 Diagonal Road
Alexandria, VA 22314

EXAMINER	
ALEJANDRO MULERO, LUZ L	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/647,347

Applicant(s)

CHEN ET AL.

Examiner

Luz L. Alejandro

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/15/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 26-27 are rejected under 35 U.S.C. 102(b) as being anticipated by
Holland et al., U.S. Patent 5,759,280.

Holland et al. shows the invention as claimed including a method of controlling the plasma flux distribution on a workpiece of an inductive plasma processor 10 including a plasma excitation coil 24 having a center axis and plural parallel connected windings (42,44,46,48) adapted to be driven by an excitation source, the plural parallel connected windings being concentric with the axis so an exterior winding of the coil 48 surrounds the remainder of the coil, the method comprising positioning the exterior winding relative to the remainder of the coil so the plasma density incident on the workpiece has a predetermined desired relationship (see figs. 1 and 2A and their description).

Regarding claim 27, note that the positioning step includes turning the exterior winding 48 and another winding of the coil (for example, 42,44,46) relative to each other about the axis.

Claims 26-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishii et al., U.S. Patent 5,795,429.

Ishii et al. shows the invention as claimed including a method of controlling the plasma flux distribution on a workpiece of an inductive plasma processor including a plasma excitation coil 24 having a center axis and plural parallel connected windings (24a,24b) adapted to be driven by an excitation source, the plural parallel connected windings being concentric with the axis so an exterior winding of the coil 24a surrounds the remainder of the coil, the method comprising positioning the exterior winding relative to the remainder of the coil so the plasma density incident on the workpiece has a predetermined desired relationship (see fig. 9 and its description).

Regarding claim 27, note that the positioning step includes turning the exterior winding 24a and another winding of the coil 24b relative to each other about the axis.

Claims 26-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al., U.S. Patent 6,164,241.

Chen et al. shows the invention as claimed including a method of controlling the plasma flux distribution on a workpiece of an inductive plasma processor including a plasma excitation coil having a center axis and plural parallel connected windings

adapted to be driven by an excitation source, the plural parallel connected windings being concentric with the axis so an exterior winding of the coil surrounds the remainder of the coil, the method comprising positioning the exterior winding relative to the remainder of the coil so the plasma density incident on the workpiece has a predetermined desired relationship (see fig. 6 and its description).

Regarding claim 27, note that the positioning step includes turning the exterior winding and another winding of the coil relative to each other about the axis.

Claims 26-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al., U.S. Patent 6,288,493.

Lee et al. shows the invention as claimed including a method of controlling the plasma flux distribution on a workpiece of an inductive plasma processor including a plasma excitation coil 310 having a center axis and plural parallel connected windings (310a,310b,310c) adapted to be driven by an excitation source, the plural parallel connected windings being concentric with the axis so an exterior winding of the coil 310c surrounds the remainder of the coil, the method comprising positioning the exterior winding relative to the remainder of the coil so the plasma density incident on the workpiece has a predetermined desired relationship (see fig. 3B and its description).

Regarding claim 27, note that the positioning step includes turning the exterior winding 310c and another winding of the coil (for example, 310a or 310b) relative to each other about the axis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holland et al., U.S. Patent 5,759,280 in view of Tobin et al., U.S. Patent 5,619,103.

Holland et al. shows the invention substantially as applied but does not expressly disclose wherein the exterior winding is turned relative to the another winding to assist in controlling azimuthal electric field distribution and azimuthal plasma density distribution of the processor. Tobin et al. discloses an inductive plasma apparatus including a coil in which different portions of a coil are turned relative to one another in order to vary the electric field distribution and plasma density distribution (see figs. 11a-

Art Unit: 1763

11f and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Holland et al. so as to turn, for example, the exterior winding relative to another winding because such a process can allow for control over the plasma distribution in the processing chamber.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holland et al., U.S. Patent 5,759,280 in view of Tobin et al., U.S. Patent 5,619,103 as applied to claims 28 and 30 above, and further in view of Savas, U.S. Patent 5,983,828.

Holland et al. and Tobin et al. are applied as above but do not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Holland et al. modified by Tobin et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holland et al., U.S. Patent 5,759,280 in view of Savas, U.S. Patent 5,983,828.

Holland et al. is applied as above but does not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Holland et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,795,429 in view of Tobin et al., U.S. Patent 5,619,103.

Ishii et al. shows the invention substantially as applied but does not expressly disclose wherein the exterior winding is turned relative to the another winding to assist in controlling azimuthal electric field distribution and azimuthal plasma density distribution of the processor. Tobin et al. discloses an inductive plasma apparatus including a coil in which different portions of a coil are turned relative to one another in

Art Unit: 1763

order to vary the electric field distribution and plasma density distribution (see figs. 11a-11f and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Ishii et al. so as to turn, for example, the exterior winding relative to another winding because such a process can allow for control over the plasma distribution in the processing chamber.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,795,429 in view of Tobin et al., U.S. Patent 5,619,103 as applied to claims 28 and 30 above, and further in view of Savas, U.S. Patent 5,983,828.

Ishii et al. and Tobin et al. are applied as above but do not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Ishii et al. modified by Tobin et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., U.S. Patent 5,795,429 in view of Savas, U.S. Patent 5,983,828.

Ishii et al. is applied as above but does not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Ishii et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 6,164,241 in view of Tobin et al., U.S. Patent 5,619,103.

Chen et al. shows the invention substantially as applied but does not expressly disclose wherein the exterior winding is turned relative to the another winding to assist in controlling azimuthal electric field distribution and azimuthal plasma density distribution of the processor. Tobin et al. discloses an inductive plasma apparatus

including a coil in which different portions of a coil are turned relative to one another in order to vary the electric field distribution and plasma density distribution (see figs. 11a-11f and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Chen et al. so as to turn, for example, the exterior winding relative to another winding because such a process can allow for control over the plasma distribution in the processing chamber.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 6,164,241 in view of Tobin et al., U.S. Patent 5,619,103 as applied to claims 28 and 30 above, and further in view of Savas, U.S. Patent 5,983,828.

Chen et al. and Tobin et al. are applied as above but do not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Chen et al. modified by Tobin et al. so as to use this process on a plurality of different processors

because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 6,164,241 in view of Savas, U.S. Patent 5,983,828.

Chen et al. is applied as above but does not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Chen et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Tobin et al., U.S. Patent 5,619,103.

Lee et al. shows the invention substantially as applied but does not expressly disclose wherein the exterior winding is turned relative to the another winding to assist

in controlling azimuthal electric field distribution and azimuthal plasma density distribution of the processor. Tobin et al. discloses an inductive plasma apparatus including a coil in which different portions of a coil are turned relative to one another in order to vary the electric field distribution and plasma density distribution (see figs. 11a-11f and their description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee et al. so as to turn, for example, the exterior winding relative to another winding because such a process can allow for control over the plasma distribution in the processing chamber.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Tobin et al., U.S. Patent 5,619,103 as applied to claims 28 and 30 above, and further in view of Savas, U.S. Patent 5,983,828.

Lee et al. and Tobin et al. are applied as above but do not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee et al.

modified by Tobin et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Savas, U.S. Patent 5,983,828.

Lee et al. is applied as above but does not expressly disclose wherein the method is performed on a plurality of different processors of the same type having differing azimuthal electric field and plasma density distributions from processor to processor and the exterior winding of each particular processor is turned relative to the remainder of the coil of the particular processor until tests indicate optimum uniform plasma distribution is achieved in each processor. Savas discloses an apparatus with different processors 102a, 102b that operate independently (see fig. 1 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lee et al. so as to use this process on a plurality of different processors because in such a way each processor can have its plasma distribution adjusted based upon the particular process being conducted in the processor.

Response to Arguments

Applicant's arguments filed 11/15/04 have been fully considered but they are not persuasive. Applicant argues that none of the Holland et al., Ishii et al., Chen et al., or

Art Unit: 1763

Lee et al. references disclose moving or turning an exterior winding relative to a remainder of a coil or that such movement is performed to provide a predetermined desired relationship. Note, however, that in all the references it is clear that the shape of the coil is such that in order to form the coil the exterior portion must have been bent or turned relative to the remainder of the coil. Furthermore, note that inherently this bending or turning of the coil will cause a predetermined desired relationship as necessitated by the claim. Therefore, claims 26 and 27, when given their broadest reasonable interpretation read on the above mentioned references.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of


Art Unit: 1763

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Luz L. Alejandro
Primary Examiner
Art Unit 1763

March 7, 2005